Concept Assignment, PHYS 206/01 Waves and Optics
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Sections Covered: 36.7,37.1-37.4

Mini Objectives:

(i) How the eye receives, processes, and transports light rays as impulses to the brain.
(ii) Outline of some eye problems experienced.
(iii) Examining Youngs double slit experiment as a way to measure wavelength.
(iv) Comparing and contrasting Lloyd's and Young's experiments.
(v) How path difference effects constructive versus destructive interference.

Concepts:

- The progression of how light travels through the eye is as follows; cornea, agreous humor, pupil (contained in iris), crystalline lens, retina, and finally to the optic nerve where impulses are sent to the brain and image is perceived.
- The eye focuses through a process dubbed accommodation involving the "near point" and the "far point", respectively the distances as far away and as near to the subject that the eye is able to focus on without blur.
- The retina of the eye is covered with cells called rods and cones. Rods are sensitive to light and enhance seeing in the dark, and cones are sensitive to color.
- All light is contained into three categories of colored light; red, green, and blue. All colors of visible light is made up of combos of these three colors. If all are seen together, it is perceived as white light.
- Farsightedness is a mismatch of the cornea-lens system where the eye focuses light of far away objects, but not those that are close to the eye. Nearsighted people can focus on nearby objects but not those far away. Farsightedness is corrected by a converging lens and nearsightedness is corrected using a diverging lens.
- In Youngs Double Slit experiment, Young created a point source and directed it through two slits as to simulate two point sources, while still ensuring the light rays were in phase and monochromatic. He observed constructive and deconstructive interference and was able to measure wavelength gleaning information from this observation.
- For the 2-dimensional interface of waves in interference, two slits were made at different lengths from the same destination, giving rise to the realization that path difference effects lights ability to have deconstructive or constructive interference. By measuring the linear positions of the light and dark fringes created by interference, wavelength was able to be measured.
- However, the fringes examined as interference of both deconstructive and constructive nature were not gradient, not uniformly intense. This was due to the waves not being completely in or out of phase, but somewhere in the middle. It was postulated that phase difference depends on the path difference and angle of incidence.
- Light intensity can be described as the square of the electric field produced by the light emerging from the slights.
- Constructive interference produces light intensity max, while deconstructive interference produces light intensity minimums.
- If interference is produced by one normal ray and one ray which has been reflected to simulate two rays emerging from different point sources, then the reflected ray will have a phase change of 180 degrees from that of the original ray.